

A Comparison of the CO₂, Argon, and KTP/532 Lasers in the Videolaseroscopic Treatment of Endometriosis

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ABSTRACT

Several surgical lasers are available currently for laparoscopic use, including the carbon dioxide (CO₂), argon, and potassium-titanyl-phosphate (KTP/532 nm) lasers. These lasers each have different properties that offer advantages and disadvantages in the treatment of endometriosis. In the present study, 120 patients with different stages of endometriosis were divided into three groups of 40 patients. Each group underwent videolaseroscopy using one of the three lasers listed above. All three lasers appear to be safe and effective for the laparoscopic treatment of endometriosis. There were no complications experienced, and satisfactory results were obtained in all three groups. This paper discusses and compares the properties of the CO₂, argon, and KTP/532 lasers and the results in each of the three groups of patients. Although the number of patients is too small to make a definite conclusion, it appears that the results of argon and KTP/532 lasers are identical. The outcome for pain relief and fertility appears to be better with CO₂ lasers.

INTRODUCTION

SEVERAL INVESTIGATORS HAVE REPORTED on the successful laparoscopic use of surgical lasers for the treatment of endometriosis. The carbon dioxide (CO₂) laser was

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TABLE 1. AMERICAN FERTILITY SOCIETY STAGE CLASSIFICATIONS FOR 120 ENDOMETRIOSIS PATIENTS DIVIDED INTO TREATMENT GROUPS BY LASER USED

<i>AFS stage</i>	<i>No. of CO₂ patients</i>	<i>No. of argon patients</i>	<i>No. of KTP/532 patients</i>
I	7	18	12
II	17	8	16
III	10	9	8
IV	6	5	4

(Richard Wolf Medical Instruments Corp., Rosemont, IL) or the Cabot 10 mm laparoscope (Cabot Medical, Langehorne, PA), was used.

Group I was treated with the Cooper 500Z CO₂ laser (Cooper Lasersonics, Santa Clara, CA). A 40 W power setting of the superpulse mode of the CO₂ laser was used with 500 pulses/second and a 1.0 msec pulse width. Group II was treated with the argon laser (HGM Medical Lasers Inc., Salt Lake City, UT). An 8–14 W setting was used with a 2 mm spot size and a 2–5 second delivery time. Group III was treated with the KTP/532 laser (Laserscope, Santa Clara, CA). An 8–10 W setting was used for treating endometrial implants and fibrous scars, and an 8–12 W setting was used for dissecting adhesions and the capsules of endometriomas.

A Nezhat direct coupler (Cabot Medical) was used and attached to the laparoscope for use with the CO₂ laser. A monoshutter was attached for use with both the argon and KTP/532 lasers. The fiber lasers (argon and KTP/532) were used through the laparoscope or second puncture probe.

During the course of this study, a laser videomonitoring technique incorporating a miniature, laparoscope-mounted videocamera, a videorecorder, and a high-resolution videomonitor was used. Storz (KarlStorz Endoscopy America, Inc., Culver City, CA), Wolf, and Cabot videocameras were used interchangeably. All three cameras provide high resolution of between 275 and 350 lines and quality tapes. The videorecorder was used to create a permanent record on each patient.

Preoperatively, the possibility of laparotomy and more extensive procedures, such as colostomy or hysterectomy, was discussed with each patient. Laparoscopy was scheduled in the late proliferative or early luteal phase of the cycle to ensure optimum visualization of endometrial implants and early corpus luteum.

The procedures were performed under general endotracheal anesthesia with patients placed in the lithotomy position. The bladder was drained, and a cervical cannula was placed for manipulation of the uterus and for intraoperative injection of diluted indigo carmine. Each patient received 1 g of Mefoxin (Merck, Sharp & Dohme, West Point,

TABLE 2. CLASSIFICATION OF 120 ENDOMETRIOSIS PATIENTS DIVIDED INTO GROUPS BY LASER USED

<i>Patient complaint</i>	<i>No. of CO₂ patients</i>	<i>No. of argon patients</i>	<i>No. of KTP/532 patients</i>
Infertility	25	25	16
Pelvic pain	15	15	15
Infertility and pelvic pain	0	0	9

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TABLE 5. AMOUNT OF PAIN RELIEF FOR GROUP III: 15 PATIENTS TREATED WITH KTP/532 LASER

	6 months	12 months
Near total relief	10 (66%)	9 (60%)
Partial relief	5 (33%)	3 (20%)
No relief	0 (0%)	3 (20%)

At the end of the procedure, the smoke plume and gas were removed. After removing the laser from the laparoscope, the Nezhat suction-irrigator was used in the abdomen for the final time to push the remaining smoke and gas out through the suction as well as through the top of the laser laparoscope. We have found that this final push eases postoperative pain. Patients were routinely discharged within 24 hours of surgery.

RESULTS

A total of 120 patients were divided randomly into three groups of 40 and treated laparoscopically for endometriosis using one of three lasers. Group I was treated with the CO₂ laser, Group II with the argon laser, and Group III with the KTP/532 laser. All 120 patients were followed for at least 6 months.

In Group I, 7 patients had stage I American Fertility Society⁽¹²⁾ endometriosis, 17 had stage II, 10 had stage III, and 6 had stage IV. Eighteen patients in Group II had AFS stage I endometriosis, 8 had stage II, 9 had stage III, and 5 had stage IV. Of the 40 patients in Group III, 12 had stage I endometriosis, 16 had stage II, 8 had stage III, and 4 had stage IV (Table 1).

Of the 40 patients in Group I, 25 were infertile and 15 had pelvic pain (Table 2). Twenty-five patients in Group II were infertile and 15 patients had pelvic pain. In Group III, 16 patients were infertile, 15 had pelvic pain, and 9 had pelvic pain and were infertile.

Of the 15 patients in Group I with pelvic pain, 15 (100%) had near total relief, defined as cramps only during menses at 6 months and 13 (86%) at 12 months. One (6%) felt partial relief, defined as ability to continue normal activity but needing medication for pain at 12 months, and one (6%) at 12 months had no relief, defined as the inability to continue normal activity and needing medication for pain (Table 3). Of the 15 pelvic pain patients in Group II, 11 (73%) felt near total relief at 6 months and 9 (60%) at 12 months

TABLE 6. PREGNANCY RATE OF INFERTILITY PATIENTS TREATED WITH VIDEOLASEROSCOPY

Group (laser)	No. of patients	Pregnancy	No. of patients lost to follow-up
I (CO ₂)	25	17 (68%)	3
II (Argon)	25	6 (24%)	3
III (KTP/532)	16	6 (37%)	0

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argon and KTP/532 fibers can accidentally damage surrounding tissue. We are currently doing further statistical analysis to evaluate our results and believe that more long-term follow-up is necessary if we are to draw any definite conclusions about these lasers.

ACKNOWLEDGMENT

We would like to thank Jeffrey D. Cooper for typing this manuscript.

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